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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/088,659	03/20/2002	Tatsuo Akimoto	1069-02	2778
35811	7590	05/06/2004	EXAMINER	
IP DEPARTMENT OF PIPER RUDNICK LLP ONE LIBERTY PLACE, SUITE 4900 1650 MARKET ST PHILADELPHIA, PA 19103			MENON, KRISHNAN S	
			ART UNIT	PAPER NUMBER
			1723	

DATE MAILED: 05/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/088,659	<b>Applicant(s)</b> AKIMOTO ET AL.	
	<b>Examiner</b> Krishnan S Menon	<b>Art Unit</b> 1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 and 28-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 and 28-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

This is a supplementary action in response to applicant's amendment of 3/15/04, which crossed the mail with the first action after RCE mailed 3/19/04.

Claims 1-22 and 28-30 are pending.

### ***Drawings***

The drawing corrections submitted by the applicant on 3/15/04 are approved.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 09-187628 in view of Zha et al (US 6,156,200)

JP 628 teaches a hollow fiber module comprising a cylindrical case (4-fig 1), a first sealing body (7), a second sealing body (6), a first cap outside the first sealing body (3), a second cap outside the second sealing body (2), filtration chamber inside the case, first chamber inside the first cap, second chamber inside the second cap, hollow fiber bundle with ends open in the first chamber and ends sealed to the second chamber by the second sealing body (at 21,31), a

raw water supply port on the cylindrical casing (91), air discharge port (92) on the cylindrical casing, holes through the second sealing body (61), filtrate delivery port on the first cap (31), drain port on the second cap (21) as in claim 1. The covers can be opened and closed as in claim 6 (see fig – 2 and 3 - threaded). Filtration chamber is pressurization type as in claim 17 (see specification).

JP 628 do not explicitly teach connecting the raw water supply port to a raw water supply pipe, air discharge port to an air and overflowing water discharge pipe, filtrate delivery port to a filtrate delivery pipe and drain port to a drain pipe. Zha teaches connecting the respective ports (like raw water inlet, air, filtrate outlet, etc.) to the respective pipes or lines (see fig 5). It would be obvious to one of ordinary skill in the art at the time of invention that such connections are made on to an apparatus to enable one to use the apparatus in the intended process, and one would use such connections to use the apparatus as taught by Zha.

2. Claims 2-5 and 7- 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP-628 in view of in view of Zha -200 as in claim 1 above and further in view of JP 11-319507 and Kopp et al (US 4,935,143).

Instant claims add further limitations not taught by JP 628, which are taught by JP-507 as follows: Cross-sectional area of the casing can be 150 cm<sup>2</sup> or more with packing ratio 40 to 70% as in claim 2 (see spec). Hollow fibers are kept apart from the casing wall by a spacer (4) which extend from the sealing body as in claim 3, and the protruding height is about 10 mm from the casing wall

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as in claim 4 (see spec), with faces of the spacers inclined towards the center of the cylindrical case as in claim 5. The case is made of thermoplastic, particularly PVC as in claims 8 and 9 (see spec). It would be obvious to one of ordinary skill in the art at the time of invention to use the teachings of JP-507 in the teaching of JP-628 because JP-507 gives the material, cross-sectional and packing ratio details which are required in the module and not provided by JP-628; JP-507 also provides the protective spacer as in claims 3-5 for protecting the base of the hollow fibers as taught by JP-507.

Claim 7 adds further limitation of a port for air supply and a check valve in the airline supplying to air to the module. JP 507 teaches the air injection nozzles (6-figures), and Kopp teaches use of check-valve in an air line (see 73-fig 7, col 8 lines 10-15 and lines 59-68). It would be obvious to one of ordinary skill in the art at the time of invention to use air to scrub the membrane as taught by JP-507 and a check valve as taught by Kopp because it is commonly used in air supply lines to prevent backflow when the air-pressure goes down, and one would use it for membrane backwash as taught by Kopp.

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP-628 in view of Zha-200, JP-507 and Kopp-143 as in claim 9 above and further in view of Bae (US 6,362,264 B1).

Claim 10 adds further limitation of PVC having non-lead thermal stabilizer, which JP does not teach. Non-lead thermal stabilizers for PVC are taught by Bae 264 (abstract). It would be obvious to one of ordinary skill in the art at the

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time of invention to use the teaching of Bae in the teaching of JP-628 in view of JP-507 for the thermal stabilizer in PVC for drinking water or food application as taught by Bae (col 2 lines 46-60).

4. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP-628 and Zha-200 as in claim 1 above, or JP-628 in view of Zha-200, JP-507 and Kopp-143 as in claim 2 above, and further in view of Oshida et al (US 5,552,047) and Nomura et al (US 6,457,917 B1).

Claim 11 and 12 (both depending from claims 1 and 2) add limitations acrylonitrile – X-styrene co-polymer (claim 11) where X is a rubber such as ethylene-propylene (AES) or acrylic (AAS) (claim 12). Oshida teaches hollow fiber module housing having acrylonitrile – styrene copolymers (col 4 lines 3-8, lines 43-51) and Nomura teaches AES and AAS molding formulations (col 4 lines 13-25). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Oshida (047) and Nomura (917) in the teaching of JP- 628 or JP-628 in view of JP-507 for the casing for dialysis type application as taught by Oshida (col 4 lines 3-8) because AAS and AES would provide lightweight, high strength and stiffness for the housing (abstract – Nomura).

5. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 628 in view of Zha-200 as in claim 1 above and further in view of Macheras et al (US 6,290,756 B1).

Claims 13-16 add the further limitation of an epoxy resin for the sealing body, type of epoxy used and the degree of penetration of the epoxy in the hollow fiber. JP-628 does not teach that the sealing body is epoxy. Macheras teaches Bisphenol A and F type epoxies for the sealing body in a hollow fiber module (col 5 lines 29-39). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Macheras in the teaching of JP 628 for an appropriate epoxy resin material for the sealing body because Macheras teaches that type of epoxy used would provide physical and mechanical properties that can be tailored for improving the performance of the module (see abstract and col 1 1<sup>st</sup> paragraph) . Re claim 16, JP 628 in view of Macheras is silent on the degree of penetration of the epoxy into the hollow fibers. However, it would be obvious to one of ordinary skill in the art at the time of invention that the epoxy must penetrate sufficiently to provide the required seal with the sealing body to obtain sufficient sealing between the sealing body and the hollow fibers.

6. Claims 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP-628 in view of Zha-200 as in claim 1 above and further in view of Selbie et al (US 5,405,528).

Claim 18-22 add further limitations, not taught by JP-628, but taught by Selbie, as follows: Identical modules are connected with each-other with discharge ports connected to a common pipe as claim 18, modules are mounted in plural rows in a frame in claim 19 which are symmetrically positioned in claim 20, supply water and filtrate ports are connected to common supply and filtrate

pipes in claim 21 and the connections are by loose joints in claim 22. See Selbie (528), figures 5 and 6, and abstract. (The examiner is unclear what the 'loose joint' in claim 22 means, and considers this as 'joint that can be disconnected' for examination purpose). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Selbie in the teaching of JP-628 to string the modules in series/parallel for high capacity production.

7. Claims 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP-628 in view of JP-2000-157,845.

Claim 28. (New): JP-628 teaches a hollow fiber membrane module (figures) comprising a cylindrical case (4) comprising a main case member (4);  
a first sealing body provided for sealing the first end of the cylindrical case member (7),  
a second sealing body provided for sealing the second end of the cylindrical case member (6),  
a first cap provided for the first sealing body attaching member outside the first sealing body (3),  
a second cap provided for the second sealing body attaching member outside the second sealing body (2),  
a filtration chamber (chamber P) formed by an inner wall surface of the first sealing body, an inner wall surface of the second sealing body and an inner wall surface of the cylindrical case,



a first chamber (inside 3) formed by an inner wall surface of the first cap and an outer wall surface of the first sealing body,

a second chamber (inside 2) formed by an inner wall surface of the second cap and an outer wall surface of the second sealing body,

a hollow fiber membrane bundle positioned in the filtration chamber and attached to the first sealing body (5), with a first end of the bundle opened toward the first chamber, and attached to the second sealing body, with a second end of the bundle closed against the second chamber (see figure) ; or attached to the first sealing body, wherein the first and second ends of the bundle open in the direction of the first chamber, and wherein the bundle is curved in U-shape (Page 1 of English translation) ,

a raw water supply port formed (91) on the cylindrical case and opened toward the filtration chamber in a position near the second sealing body (2),

an air discharge port (92) formed on the cylindrical case and opened toward the filtration chamber in a position near the first sealing body (3),

fluid flow holes (61) for allowing the flow of air and drain fluid, formed in the second sealing body and through the second sealing body from the filtration chamber,

a filtrate delivery port formed on the first cap and opened toward the first chamber (31), and

a drain port formed on the second cap and opened toward the second chamber (21).

JP-628 teaches a unitary (integral) construction of the cylindrical case and does not teach a first and second sealing body attaching members provided for first and second ends of the case member, respectively. JP-845 teaches such a construction of a sealing body attaching member (see 2b and 2f of figure 1 – sealing body 14 is attached to part 2b; main case 2 is attached to the other end of part 2 b). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of JP-845 in the teaching of JP-628 for the case member for providing the spacing required for installing the perforated sleeve cover (10) to protect the ends of the hollow fiber membrane as taught by JP-845 (page 3 of English machine translation). It may be noted that the primary reference does have this feature simply by expanding the ends of the case member (4) in the unitary construction, and is equivalent.

Claim 29 and 30 add limitations of having the raw water supply port and air discharge ports on the second sealing body attaching member and first sealing body attaching member respectively – see figure 1 of JP-845.

### ***Response to Arguments***

Applicant's arguments filed 1/20/04 have been fully considered but they are not persuasive.

Arguments re claim 1 and claims depending from claim 1 are moot – new grounds for rejection. Arguments on claim 7 in particular: Applicant has given some lengthy arguments re patentability of claim 7, on the grounds that there are only 4 ports on the references, whereas the applicant's invention has 5 ports

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including the air inlet, which is not taught by the references. In response, the JP-507 reference teaches port 6 with injection nozzles for air inlet for scrubbing the membrane. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, the combination teaches providing an air nozzle for scrubbing the membrane.

### ***Conclusion***

This supplementary action is made non-final.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 571-272-1151. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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